An automated system for dermatological laser surgery

BRAIN TOOL LABORATORY
DUKE UNIVERSITY

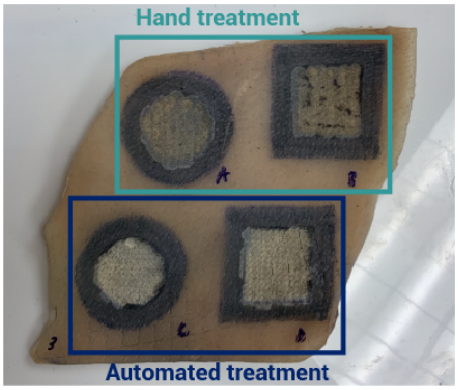
Value Proposition

Laser-based devices show promise for highly effective treatment of a range of cutaneous applications, including skin rejuvenation, tattoo removal, hair removal, vascular and pigmented lesions, and even skin cancers. During these procedures, a hand-guided device delivers laser therapy to a circumscribed area defined by the shape of the laser spot and is sequentially repositioned to deliver treatment to the entire surgical site by a human operator. However, it is **difficult to deliver uniform therapy** to only the targeted area or lesion **while minimizing collateral damage to surrounding healthy skin**. Computer-assisted laser therapy can overcome these difficulties to improve treatment.

Technology

Duke inventors have developed an automated system to perform robotic laser surgery in dermatological use cases by applying computer vision and robust control technology. Their invention could be used to improve effectiveness of, and patient comfort during, a wide range of laser-based procedures, such as tattoo removal, hair removal, and skin rejuvenation. The device uses cameras for image guidance, precision galvanometer steering mirrors, and an optimized surgical planning algorithm to deliver laser treatment to perform the desired procedure, which is input by the operator via a touch-screen tablet, in an efficient manner with minimal pain for the patient. To date, the inventors have demonstrated a laboratory prototype of the invention that is able to deliver highly precise and efficient treatment when utilized on ex vivo porcine skin with embedded tattoos.

Advantages



- Increases accuracy and precision of laser treatment by applying the optimal amount of irradiation at each point of planned treatment
- Decreases the operative time and collateral damage to skin outside the treatment area, thus reducing patient discomfort
- Highly versatile and adaptable to any laser source (e.g. existing dermatologic laser systems)
- Combines precision of computer-guidance with experience of human operator/dermatologist

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External Link(s)

• Laser and Imaging in Dermatology Surgery Project Description
• Developed by the team at the Brain Tool Laboratory